Finding your way around

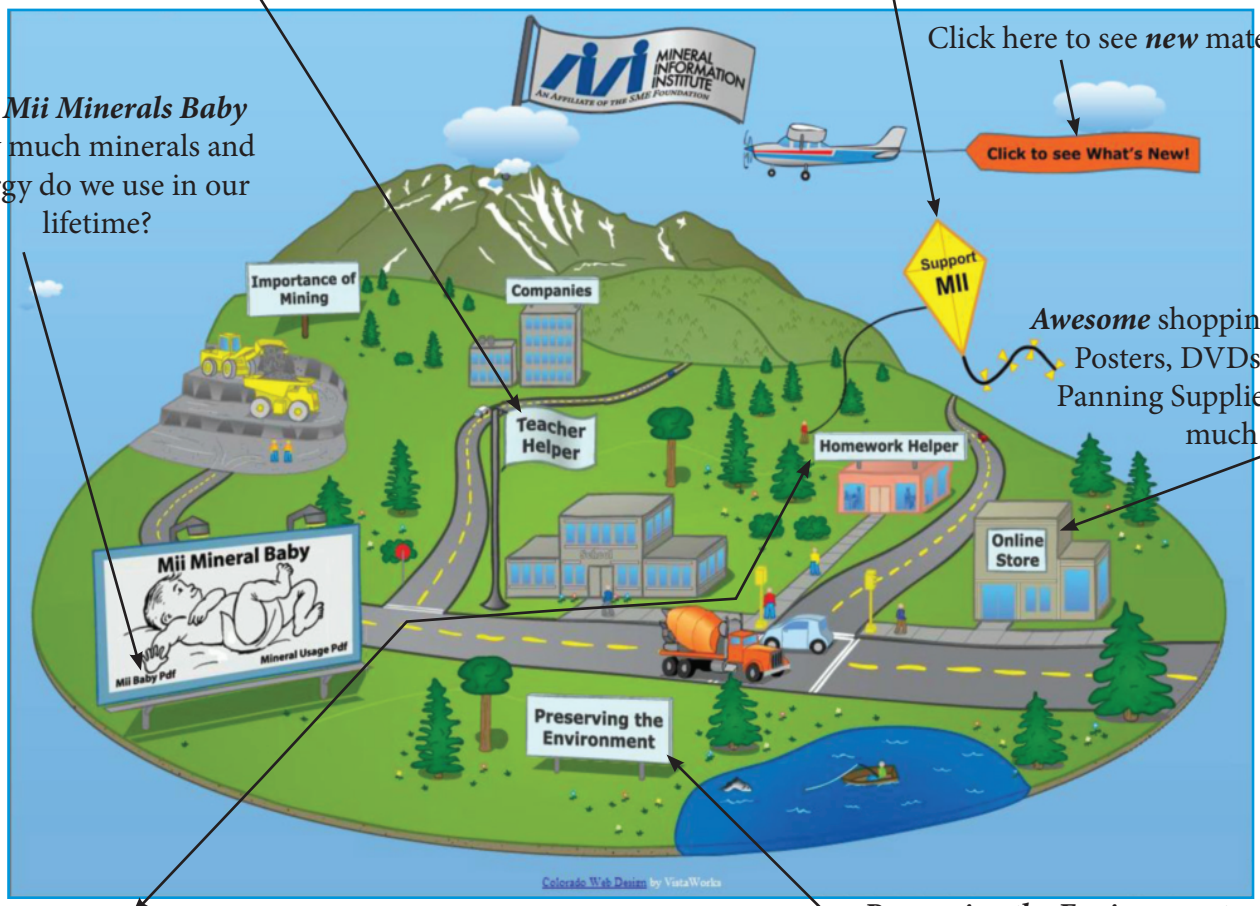
www.mii.org

For Teachers
FREE downloads. Includes student pages, graphics, activity guides, and background info.

Become a Member
and you will help support our work to provide materials and FREE downloads for teachers.

Click here to see ***new*** materials.

The Mii Minerals Baby
How much minerals and energy do we use in our lifetime?



Awesome shopping cart: Posters, DVDs, Gold Panning Supplies, and much more.

For Students
- Mineral photos, descriptions and information.
- Minerals in your state, with maps.
- Word Games

Preserving the Environment
Things you probably never knew about the ***positive*** impact mining can have on the land.

The Benefits of Membership in Mii

We always try to provide our materials free to teachers who ask to receive them. But someone has to provide the money to pay for them. That "someone" is our contributors.

By becoming a member of Mii you will help us reinforce the fact that you value the materials we provide. and these are the materials that teachers want and need.

Thank you for your help.

Idea Starters to find out about Natural Resources We Use

Everything is Made of Something

But where does that something come from?

Scientists describe it in the **Law of Conservation of Matter**:

Matter can be neither created nor destroyed, though it can be rearranged.

Science and human ingenuity have created some marvelous things. As a result, many people have lost track of where things come from because the form in which they buy and use those "things" is often dramatically changed from the original materials that created them. **We only see the end result.**

That's one of the main uses for these materials. . . to help people reconnect to the natural resources that provide **Everything We Have**.

Have your students . . .

Find out where their most recent meal came from. Find the states/provinces that produced all of the parts of their breakfast, lunch or dinner. Make it a little harder by allowing them to use each state only once. Help is available at www.usda.gov.

Plan a holiday menu, with all the trimmings. List those states that produced the foods eaten at Thanksgiving, Christmas, Kwanzaa, Passover, July 4th, Easter, etc. Visit www.usda.gov.

Find out which regions helped them get dressed this morning. Which states/provinces created the cotton, wool, leather, rubber, plastic, metals, and synthetic fibers (nylon, rayon, acrylic, polyester, etc.) that were used to make their clothes.

Look at one thing, anything, like tennis shoes. They are usually made of a half dozen different minerals and "grown" materials. A little help at www.mii.org/pdfs/clothing.pdf* .

Create a collage of products made from the metals, minerals, and agricultural resources from your region.

* *Note: pdf files download to your computer and should automatically open in Acrobat Reader.*

Find all the natural resources it takes to produce a loaf of bread. First, you need to identify all the steps of production; planting, fertilizing and harvesting the wheat, transportation of it to a processing plant, refrigeration, shipping flour to bakery, baking, packaging, marketing and sales. You can skip a few of these steps if you bake the bread at home, but even then, you will use a lot of resources in the cooking utensils, oven, and energy. Let your students get wild and see who can create the longest list of natural resources necessary to get a slice of bread. Help is available at www.usda.gov, www.fb.com, and www.mii.org.

Pick two regions or provinces, the one you live in and the other one far away. What would you trade or barter with the other region to enhance your life?

Design a travel brochure of your state or region. The brochure should include a description of the topography, climate, special places of interest, the top agricultural commodities, mining sites, and a map that shows the location of the main rivers, cities, and highways in the region.

Food, Clothing, Shelter *ALL* Come from Our Natural Resources

Language Arts, Social Studies, & Science Connections

Pick a Topic and expand it

This same information, with links, is available at www.mii.org/lessons.html

NOTE: ANY FILE WITH PDF IN THE ADDRESS IS A DIRECT DOWNLOAD, NOT A VIEW ON SCREEN UNLESS YOU HAVE PROGRAMMED YOUR COMPUTER TO DO SO.

A Bright Smile from Toothpaste and Minerals: A listing of the various minerals and metals used in toothpaste, and the role each of them plays in keeping your teeth bright and healthy.
www.mii.org/toothpaste.html

Find Out What's Beyond the Looking Glass: The magic of at least six different minerals, in the right combination, make glass. It's been around for nearly 5,000 years and today we can't live without it.
www.mii.org/glass.html

What's Really in Paper Besides Wood? More than 250 million tons are produced every year, but paper can't exist without the special feature that minerals provide.
www.mii.org/paper.html

Money, Made of Metal and Promises: One of the greatest inventions of all time.
www.mii.org/money.html

Eat Your Broccoli, It Contains Selenium - The Brain Food: Health and nutrition are dependent upon minerals. Without them, life is not possible.
www.mii.org/nutrition.html

What's In A Pencil Besides Wood: Natural resources from a half dozen states and at least two countries are necessary to make something as simple as a wood pencil. How was it ever invented?
www.mii.org/pencil.html

Find Out Where the Sidewalk Begins: Almost anybody can build a sidewalk but can your community make a sidewalk? There is more to the ingredients of a good sidewalk than you think.
www.mii.org/sidewalk.html

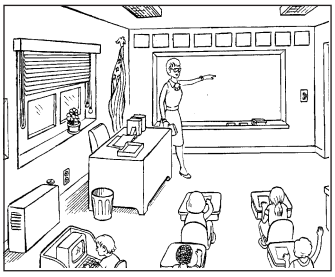
The History of Gold Is the History of the World: Gold — it conquered nations and settled the world. It has more history than perhaps any other natural resource.
www.mii.org/goldhist.html

How Many Minerals & Metals Does It Take to Make A Light Bulb? With so much science and technology behind something so common, it's a wonder it was ever invented.
www.mii.org/lightbulb.html

Mineralized Map of Alaska: Major mineralization is known to occur in Alaska.
www.mii.org/pdfs/alaskamap.pdf

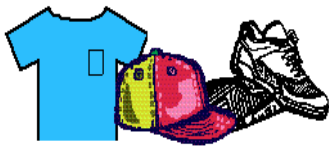
Is It Animal, Vegetable, or Mineral? Take your pick from the items on these two pages. It's not as easy as you think.
www.mii.org/pdfs/anminveg.pdf

A Classroom Full of Resources: 4 pages. Includes guide and suggested activities for students to realize everything in the school and home is made of resources. Includes classroom identification and coloring page. Two-page list and description of how mineral resources are used throughout their home.



www.mii.org/pdfs/classroom.pdf

Clothing Matters, Let's Learn About Clothes: 2 pages. What are clothes made from? Living or non-living resources. Extensive connections and activities, plus student work sheet to find out what they are wearing. www.mii.org/pdfs/clothing.pdf



Idea Starters to find out about Natural Resources We Use

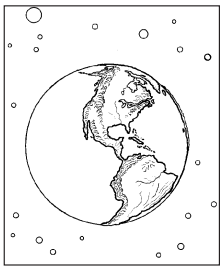
How Much Electricity Does It Take to Light Your Classroom: Or your entire school or your house. Plus map and facts page on where coal comes from, plus a math guide for you to look at the electricity use in your home. www.mii.org/pdfs/coalmath.pdf

Home on the Range: Was the original song really written by mining prospectors high in the Colorado Rockies? Read the history, study the verses, and find out what the original publisher of the song says. www.mii.org/pdfs/cohome.pdf

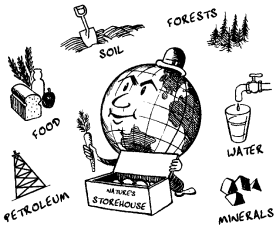
Uses of Common Minerals: 3 pages of brief descriptions of the most common minerals and their uses. Good for reference and/or quick study. www.mii.org/pdfs/mineraluses.pdf

Mining Long Ago & Today: Two coloring pages to help recognize the difference between the image of the lone prospector a hundred years ago, and today's mining industry. www.mii.org/pdfs/mining.pdf

Natural Resources Matter: Everything is made from a natural resource. Classroom instructions and games are included. 4 pages. www.mii.org/pdfs/natresmatter.pdf



An Appreciation of the Earth and All It Provides: An introduction to recognizing and appreciating the Earth as the source for all the natural resources we depend upon. 3 pages, including two coloring pages. www.mii.org/pdfs/naturallyyours.pdf



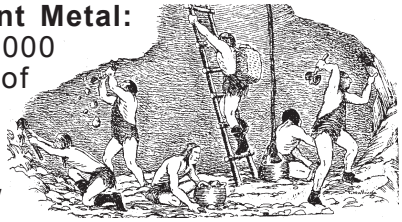
The Earth - Nature's Storehouse: 2 pages. What are mineral resources? How are they distributed in nature? How are they used to supply food? And more. www.mii.org/pdfs/naturestorehouse.pdf

Per Capita Use of Minerals in the U.S.: Every year, 38,000 pounds of new minerals must be mined for every person in the United States just to maintain our standard of living. Graphic shows which minerals and metals, and how much. www.mii.org/pdfs/percapita.pdf

MII Baby: Graphic showing the 2.96 million pounds of various minerals and metals the average American will need in their lifetime. www.mii.org/pdfs/baby.pdf

A World of Resources: Almost everything we have and use comes from our mineral resources, yet no country in the world is self-sufficient in producing these resources to meet their needs. Find out a little about the U.S. and the resources we don't produce. www.mii.org/pdfs/worldresources.pdf

Copper- The Ancient Metal: Used for at least 4,000 years. The history of copper, its uses, and description of the various copper ores. www.mii.org/pdfs/copper.pdf



Farming Long Ago & Today: Two coloring pages to help recognize the difference between the romantic, but hard working image of farming a hundred years ago, and farming today. www.mii.org/pdfs/farming.pdf

Geology and Natural Resource Development: Two page description of what geology is, the formation of mineral resources, and the steps involved in making a mineral resource useful. www.mii.org/pdfs/geology.pdf

Mineral Import Reliance Chart: Chart showing 37 different minerals and metals that the U.S. needs to import from other countries to meet our needs and sustain our economy and jobs. www.mii.org/pdfs/imports.pdf

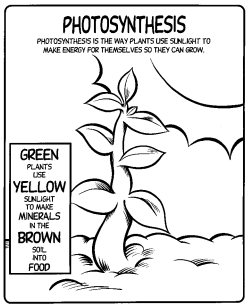
Land Poster: One page graphic showing all the different ways land is used. www.mii.org/pdfs/landposter.pdf

How Do We Use Our Land: A sequential, six-page thinking and writing activity to help people look at land, think about what it could, should, or must be, and decide what they would do if they were "King of the Land." Includes a poster showing many of the uses we want our land to provide. www.mii.org/pdfs/landuse.pdf

Mining Legends: Legend of the Lost Dutchman (with map activity) and historic facts of the first authenticated gold discovery in the United States. 4 pages. www.mii.org/pdfs/legends.pdf

Project Vadar: What if you had to colonize Mars? What would you need to take? What skills and talents would you have to have? Who would you take with you for your crew. Doctor? Farmer? Miner?. www.mii.org/pdfs/mars.pdf

Idea Starters to find out about Natural Resources We Use



Role of Minerals in Plant Growth & Health: 7 coloring & activity pages of information about the important role of nitrogen, potassium, and phosphate in healthy plants. There are 13 other elements necessary for healthy plants.
www.mii.org/pdfs/plants.pdf

Recycling Metals: Aluminum isn't the only metal being recycled, nor is it the most recycled metal. There's lots going on and these two pages will provide you with a little information.
www.mii.org/pdfs/recycle.pdf

The Sound of Music is the Sound of Metals at Work: Almost every instrument ever made contains metals.
www.mii.org/music.html

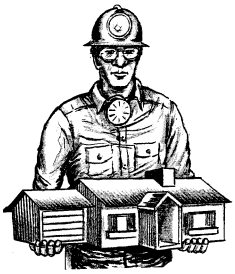
Our Basic Needs- Food, Clothing, Shelter: An introductory list to think about "Where Things Come From." www.mii.org/pdfs/basicneeds.pdf

Map: Sand & Gravel Mines in the U.S.: Map of counties in the U.S. where sand & gravel and crushed rock are mined to build your roads, buildings, and many other things you use every day.
www.mii.org/pdfs/sgmines.pdf

Known Occurrences of Mineral Resources in the United States. 2 pages.
www.mii.org/pdfs/stateminerals.pdf

Build A Volcano: A cut-color-paste activity to learn about the different types of volcanoes, showing the underground workings that make them "work." 3 pages.
www.mii.org/pdfs/volcano.pdf

Common Minerals: Listing, with photographs, of the most common minerals and how we use them.
www.mii.org/commonminerals.html



Your House: Where do all the materials used to build your house come from?
www.mii.org/pdfs/your house.pdf

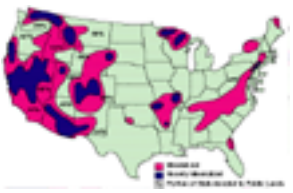
Why Do We Mine? Statistics and examples of the long list of mineral resources in a variety of materials. Life expectancy; the more than 40 minerals found in a car; consumption of minerals 1776 vs. today; and more.
www.mii.org/pdfs/every/why1.pdf

People and the Earth: How ancient people used minerals, definitions of an ore body, and games.
www.mii.org/pdfs/peopleandearth.pdf

Pan For Gold In Your Classroom: Experience the greatest classroom activity ever. Use it to demonstrate gravity, or have your students experience Gold Rush Fever when they study the westward movement.
www.mii.org/store/gold-panning

Map: Major Coal Fields in the U.S.: Showing the major regions where the four different types of coal are found and mined. www.mii.org/pdfs/coalmap.pdf

Minerals Make Christmas: More than 20 minerals play a vital role in helping us celebrate the Christmas Holidays. Find out how in this 2-page activity.
www.mii.org/pdfs/xmastree.pdf



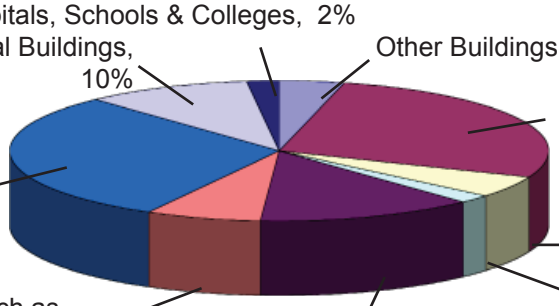
Map: Known Oil and Gas Fields in the lower United States.
www.mii.org/pdfs/oilgasmap.pdf

Map: Mineralized Areas of the U.S.: Where are the major mineral deposits in the United States?
www.mii.org/pdfs/mineralmap.pdf

Uses of Aggregates

In the U.S., we mine and use about 2 ¾ billion tons of aggregates every year.

We All Use Aggregates



Source: California Department of Conservation, Division of Mines and Geology

States Where Minerals Are Found and Mined

Minerals can be found only where they exist and not every place was created equal. Using a map of the U.S. find out which minerals occur in only certain regions of the country.

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Antimony	ID.
Asbestos	CA.
Barite	NV, GA, TN.
Beryllium	UT.
Boron	CA.
Bromine	AR, MI.
Brucite	NV.
Cement (Masonry)	IN, FL, AL, SC, PA, AZ, AR, CA, CO, GA, HI, ID, IA, KS, KY, ME, MD, MI, MO, MT, NE, NM, NY, OH, OK, OR, SD, TN, TX, VA, WA, WV.
Cement (Portland)	CA, TX, PA, MI, MO. All other States, except AK, CT, DE, LA, MA, MN, NH, NJ, NC, ND, RI, VT, WI.
Clays- Ball	TN, KY, TX, MS, MO.
Clays- Bentonite	WY, MT, AL, MS, UT, AZ, CA, NV, OR, TX.
Clays- Common	AL, NC, TX, GA, OH. All other States, except AK, DE, HI, ID, NV, NH, RI, VT, WI.
Clays- Fire	OH, MO, CA, AL, KY, NM.
Clays- Fuller's Earth	GA, MS, FL, IL, MO, CA, KS, NV, TN, TX, UT, VA.
Clays- Kaolin	GA, SC, AL, AR, CA, FL, NV, NC, PA, TN, TX.
Copper	AZ, UT, NM, NV, MT, AK, ID, MO, TN, WI.
Diatomite	CA, NV, OR, WA.
Emery	OR.
Feldspar	NC, CA, VA, OK, GA, ID, SD.
Garnet	ID, NY, MT.
Gemstones	TN, KY, AZ, CA, MT. All other States.
Gold	NV, CA, UT, SD, AK, AZ, CO, ID, MT, NM, SC, WA, WI.
Greensand marl	NJ.
Gypsum	OK, TX, IA, MI, CA, AZ, AR, CO, IN, KS, LA, NV, NM, NY, OH, SD, UT, VA, WA, WY.
Helium- Crude	KS, TX, OK.
Helium- Grade-A	KS, WY, TX, OK, UT, CO.
Iodine	OK.
Iron ore	MN, MI, MO, SD, NM, CA.
Kyanite	VA.
Lead	MO, AK, ID, MT, CO, NY, TN.
Lime	MO, KY, OH, AL, PA. All other States, except AK, CT, DE, FL, HI, KS, ME, MD, MS, NH, NJ, NM, NY, NC, RI, SC, VT.
Lithium minerals	NV, NC.
Magnesite	NV.
Magnesium compounds	MI, CA, UT, FL, DE, TX.
Magnesium metal	TX, UT, WA.
Manganiferous ore	SC.
Mercury	NV, CA, UT.
Mica	NC, GA, NM, SC, SD.
Molybdenum	CO, AZ, UT, ID, MT, NM.
Olivine	WA, NC.
Palladium	MT.
Peat	FL, MI, ME, IL, MN, CO, IN, IA, MA, MT, NJ, NY, NC, OH, PA, WA, WV, WI.
Perlite	NM, AZ, CA, OR, NV.
Phosphate rock	FL, ID, NC, UT.
Platinum metal	MT.
Potash	NM, UT, MI, CA.
Pumice	OR, NM, CA, ID, AZ, KS.
Rare-earths	CA.
Salt	LA, TX, NY, KS, OH, AL, AZ, CA, MI, NV, NM, OK, UT, WV.
Sand & gravel (Construction)	CA, MI, TX, OH, WA. All other States.
Sand gravel (Industrial)	IL, MI, CA, TX, WI. All other States, except AK, CT, DE, HI, KY, ME, NH, NM, OR, SD, UT, VT, WY.
Silica stone	AR, WI, OH.
Silver	NV, AK, ID, AZ, UT, CA, CO, MO, MT, NM, NY, SC, SD, TN, WA, WI.
Soda ash	WY, CA.
Sodium sulfate	CA, TX.
Stone (Crushed)	PA, TX, OH, FL, VA. All other States, except DE and ND.
Stone (Dimension)	IN, VT, MA, WI, NM. All other States, except AK, DE, FL, HI, IL, IA, KY, LA, MS, NE, NV, NJ, ND, OR, RI, UT, WY.
Sulfur	LA, TX.
Talc	MT, TX, VT, NY, NC, CA, OR, VA.
Titanium	FL, CA.
Tripoli	IL, OK, AR, PA.
Vanadium	ID.
Vermiculite	SC, VA.
Wollastonite	NY.
Zeolites	NM, TX, OR, AZ, NV, WY.
Zinc	AK, TN, NY, MO, MT, CO, ID.
Zircon	FL.

State Mineral Production

	Rank*	List of the *major* minerals produced in that state
Alabama	17	Coal, stone, cement, lime, sand and gravel, crude oil & natural gas.
Alaska	15	Crude oil, zinc, gold, lead, silver, coal, sand and gravel, natural gas.
Arizona	1	Copper, sand and gravel, cement, molybdenum, stone, coal.
Arkansas	29	Bromine, stone, cement, sand and gravel, coal, crude oil.
California	3	Crude oil, sand and gravel, cement, boron, stone, natural gas, soda ash, coal.
Colorado	26	Coal, crude oil & natural gas, sand and gravel, cement, stone, gold, molybdenum.
Connecticut	45	Stone, sand and gravel, clays (common), gemstones.
Delaware	50	Sand and gravel, magnesium compounds, gemstones.
Florida	4	Phosphate rock, stone, cement, sand and gravel, crude oil, titanium concentrates.
Georgia	6	Clays (kaolin), stone, cement, clays (fuller's earth), sand and gravel.
Hawaii	43	Stone, cement, sand and gravel, gemstones.
Idaho	31	Phosphate rock, silver, sand and gravel, molybdenum, gold.
Illinois	18	Coal, stone, cement, sand and gravel, crude oil, lime.
Indiana	21	Coal, stone, cement, sand and gravel, lime.
Iowa	30	Stone, cement, sand and gravel, gypsum (crude), lime.
Kansas	25	Crude oil & natural gas, cement, salt, stone, helium, coal.
Kentucky	28	Coal, stone, lime, cement, sand and gravel, crude oil, clays (ball).
Louisiana	32	Crude oil & natural gas, salt, sulfur (Frasch), sand and gravel, stone, coal.
Maine	46	Sand and gravel, cement, stone, peat.
Maryland	34	Stone, cement, sand and gravel, coal.
Massachusetts	40	Stone, sand and gravel, lime, clays (common).
Michigan	9	Iron ore, cement, sand and gravel, stone, crude oil, magnesium compounds.
Minnesota	7	Iron ore, sand and gravel, stone.
Mississippi	41	Crude oil, sand and gravel, cement, clays (fuller's earth), stone.
Missouri	10	Coal, stone, cement, lead, lime, zinc.
Montana	27	Coal, crude oil, palladium, copper, gold, cement, platinum.
Nebraska	42	Cement, sand and gravel, stone, lime.
Nevada	2	Gold, sand and gravel, silver, lime, diatomite.
New Hampshire	47	Sand and gravel, stone, gemstones.
New Jersey	38	Stone, sand and gravel, greensand marl, peat.
New Mexico	14	Crude oil & natural gas, coal, copper, potash, sand and gravel, cement, perlite.
New York	16	Stone, cement, salt, sand and gravel, zinc.
North Carolina	19	Stone, phosphate rock, sand and gravel, feldspar.
North Dakota	48	Coal, crude oil, sand and gravel, lime, stone, clays (common).
Ohio	13	Coal stone, sand and gravel, crude oil, salt, lime, cement.
Oklahoma	33	Crude oil & natural gas, stone, cement, sand and gravel, helium (Grade-A), coal.
Oregon	37	Stone, sand and gravel, cement, diatomite, lime.
Pennsylvania	11	Stone, cement, sand and gravel, lime.
Rhode Island	49	Stone, sand and gravel, gemstones.
South Carolina	23	Cement, stone, cement, sand and gravel, gold.
South Dakota	36	Gold, cement, sand and gravel, stone.
Tennessee	20	Stone, zinc, cement, sand and gravel, clays (ball), coal.
Texas	5	Cement, stone, sand and gravel, coal, lime, salt.
Utah	8	Copper, crude oil, magnesium metal, gold, sand and gravel, cement.
Vermont	44	Stone, sand and gravel, talc and pyrophyllite, gemstones.
Virginia	22	Coal, stone, cement, sand and gravel, lime, clays (fuller's earth).
Washington	24	Sand and gravel, stone, magnesium metal, cement, gold.
West Virginia	39	Coal, stone, cement, sand and gravel, lime, salt.
Wisconsin	35	Stone, sand and gravel, lime.
Wyoming	12	Coal, crude oil & natural gas, soda ash, clays, helium (Grade-A), cement, stone.

* Rank in value, not counting coal, oil and natural gas

35 different minerals and metals

What's in a computer?

Material	Weight in 60 lb. computer	Use/Location
Plastics	13.8 (lbs.)	Includes organics, oxides other than silica
Lead	3.8 (lbs.)	Metal joining, radiation shield CRT, PWB *
Aluminum	8.5 (lbs.)	Structural, conductivity/housing, CRT, PWB, connectors
Germanium	< 0.1 (lbs.)	Semiconductor/PWB
Gallium	< 0.1 (lbs.)	Semiconductor/PWB
Iron	12.3 (lbs.)	Structural, magnetivity/(steel) housing, CRT, PWB
Tin	0.6 (lbs.)	Metal joining/PWB, CRT
Copper	4.2 (lbs.)	Conductivity/CRT, PWB, connectors
Barium	< 0.1 (lbs.)	In vacuum tube/CRT
Nickel	0.51 (lbs.)	Structural, magnetivity/ (steel) housing, CRT, PWB
Zinc	1.32 (lbs.)	Battery, phosphor emitter/PWB, CRT
Tantalum	< 0.1 (lbs.)	Capacitors/PWB, power supply
Indium	< 0.1 (lbs.)	Transistor, rectifiers/PWB
Vanadium	< 0.1 (lbs.)	Red phosphor emitter/CRT
Terbium	trace	Green phosphor activator, dopant/CRT, PWB
Beryllium	< 0.1 (lbs.)	Thermal conductivity/PWB, connectors
Gold	< 0.1 (lbs.)	Connectivity, conductivity/PWB, connectors
Europium	< 0.1 (lbs.)	Phosphor activator/PWB
Titanium	< 0.1 (lbs.)	Pigment, alloying agent, (aluminum) housing
Ruthenium	< 0.1 (lbs.)	Resistive circuit/PWB
Cobalt	< 0.1 (lbs.)	Structural, magnetivity/(steel) housing, CRT, PWB
Palladium	< 0.1 (lbs.)	Connectivity, conductivity/PWB, connectors
Manganese	< 0.1 (lbs.)	Structural, magnetivity/(steel) housing, CRT, PWB
Silver	< 0.1 (lbs.)	Conductivity/PWB, connectors
Antinomy	< 0.1 (lbs.)	Diodes/housing, PWB, CRT
Bismuth	< 0.1 (lbs.)	Wetting agent in thick film/PWB
Chromium	< 0.1 (lbs.)	Decorative, hardener/(steel) housing
Cadmium	< 0.1 (lbs.)	Battery, blue-green phosphor emitter/housing, PWB, CRT
Selenium	0.00096 (lbs.)	Rectifiers/PWB
Niobium	< 0.1 (lbs.)	Welding alloy/housing
Yttrium	< 0.1 (lbs.)	Red phosphor emitter/CRT
Rhodium	trace	Thick film conductor/PWB
Platinum	trace	Thick film conductor/PWB
Mercury	< 0.1 (lbs.)	Batteries, switches/housing, PWB
Arsenic	< 0.1 (lbs.)	Doping agents in transistors/ PWB
Silica	15 (lbs.)	Glass, solid state devices/CRT, PWB

* CRT- cathode ray tube

* PWB- printed wire boards (circuit boards)

Source: www.svtc.org/cleancc/pubs/sayno.htm#etoxics.htm

Fifty years ago some of these metals and elements hadn't even been discovered. Do you think the computer could have been invented without these elements?

What would your life be like without plastics *(made from fossil fuels)?*

. . . without aluminum?

. . . without copper?

. . . without iron?

. . . without electricity?

How Much Electricity Do Computers Need in Cyperspace

For every 2 megabytes of data moved on the Internet, the energy from about 2 oz. of coal is needed to create the necessary kwh. Order a book on the Internet and you burn about an eighth of a pound of coal.

According to Berkeley Lab's Environmental, office computers and networking equipment uses about two percent of total U.S. electricity consumption—3% if you count telephone switching equipment and manufacturing energy for semiconductors and computers. This demand for electricity didn't exist 20 years ago.

We Need to Stop Throwing Them Away

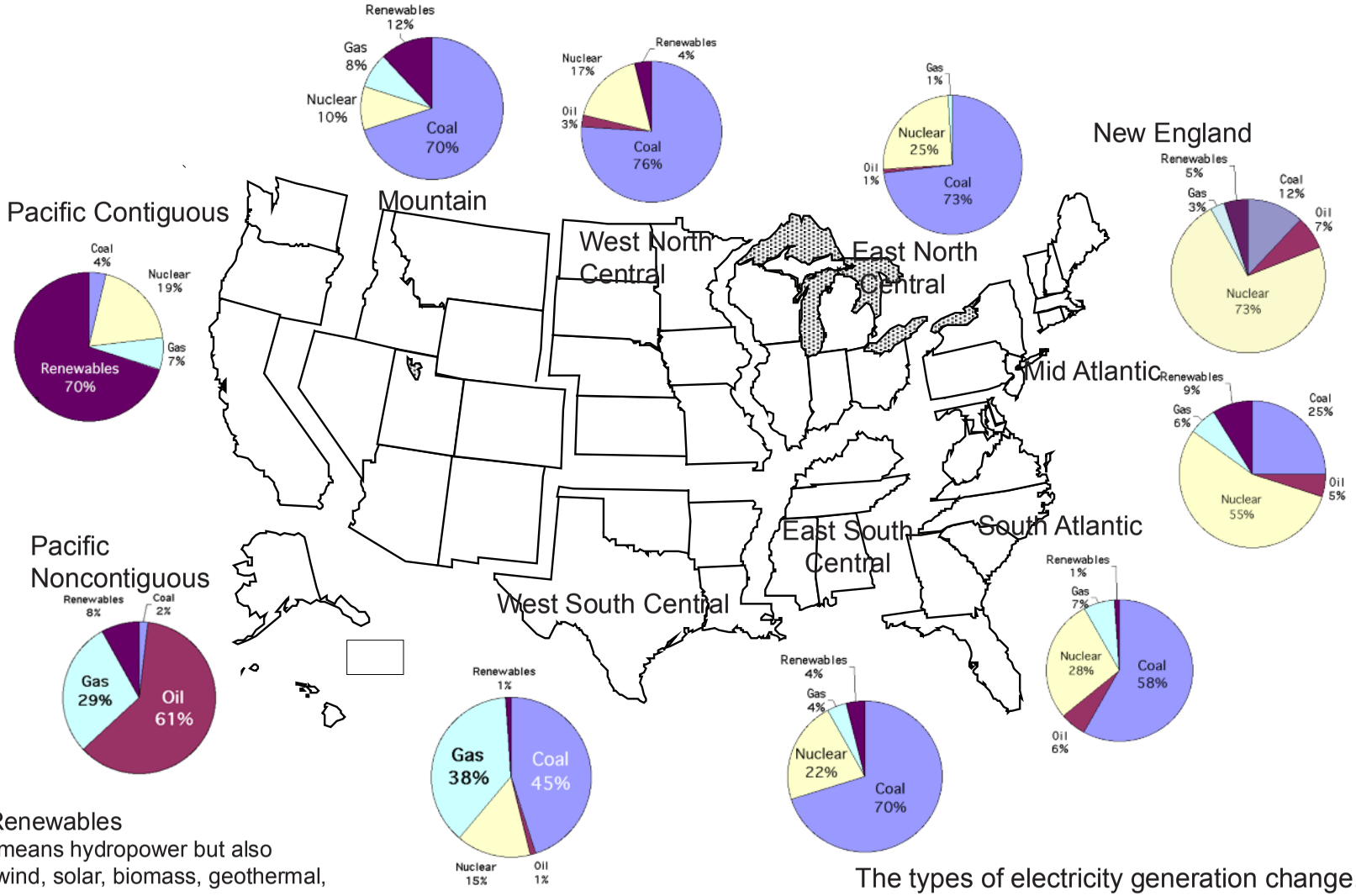
In 2007 and 2008, just two computer manufacturers (HP and Dell) made more than 250 million new computers to meet the demand.

The Environmental Protection Agency says that more than 100 million computers (every year) are taken out of service.

How many are thrown away? No one knows.

In contrast, of the major appliances that are sold each year, about 70% of the machines they replace are recycled. Major appliances are washing machines, air conditioners, refrigerators, dryers, dishwashers and freezers.

Different Regions of the Country Rely on Different Generation Mixes for Electricity



Renewables
primarily means hydropower but also includes wind, solar, biomass, geothermal, and others.

The types of electricity generation change. Also with the national power grid, electricity is shared among the regions and even across country borders.

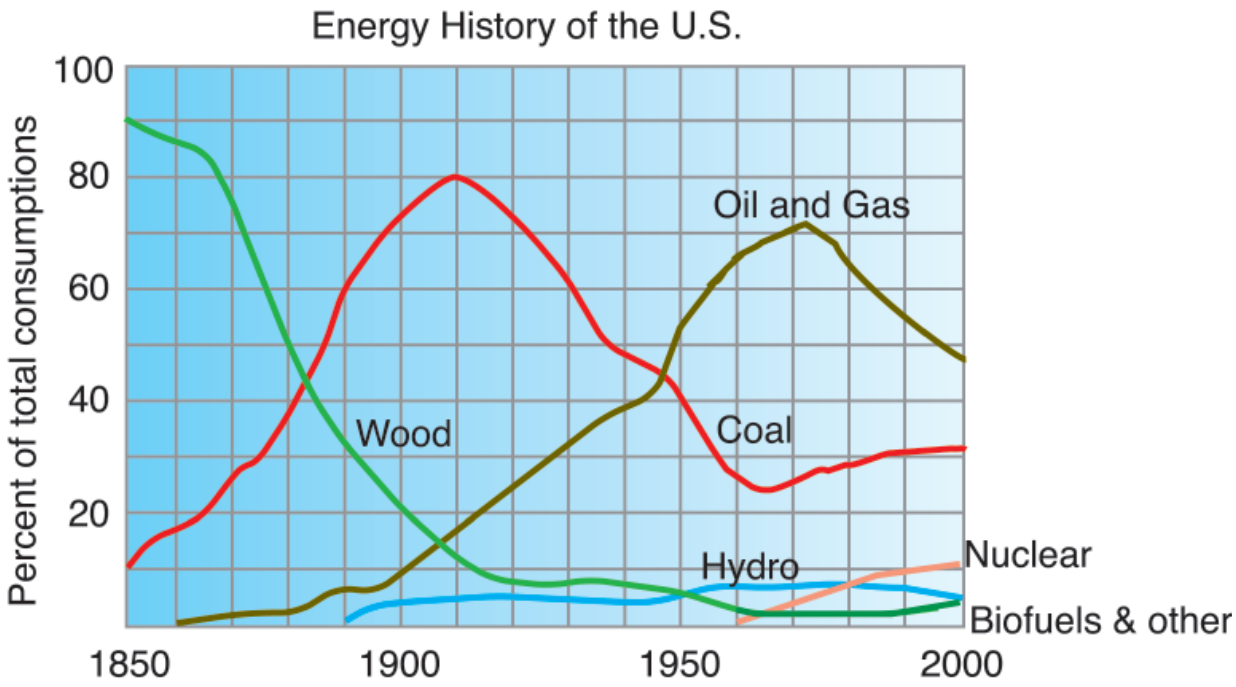
Source of statistics: Energy Information Administration, Electric Power Monthly, 2005. www.eia.doe.gov/

Things you never knew were made of coal, oil, and gas

Coal Tree courtesy of
West Virginia Coal Association

In addition to providing fuel, there are nearly 3,000 different products made from coal, oil, and gas. They are used to make virtually all of our synthetic and plastic materials, along with products such as inks, crayons, bubble gum, detergents, deodorants, eyeglasses, tires, and a thousand other things.

Sources of Energy in the United States



Name _____

1. In what year was Wood consumption the greatest? _____

2. What was the percentage of Coal consumption in 1910? _____

3. In 1960, what was the total percentage of consumption of Oil & Gas, and Coal? _____

4. In 2000, what forms of energy provided the least percentage of consumption? _____

5. In 2000, what forms of energy provided the greatest percentage of consumption? _____

6. In what year did Coal and Oil & Gas provide the same amount of total energy consumption? _____

Source: Statistics from Energy Information Administration

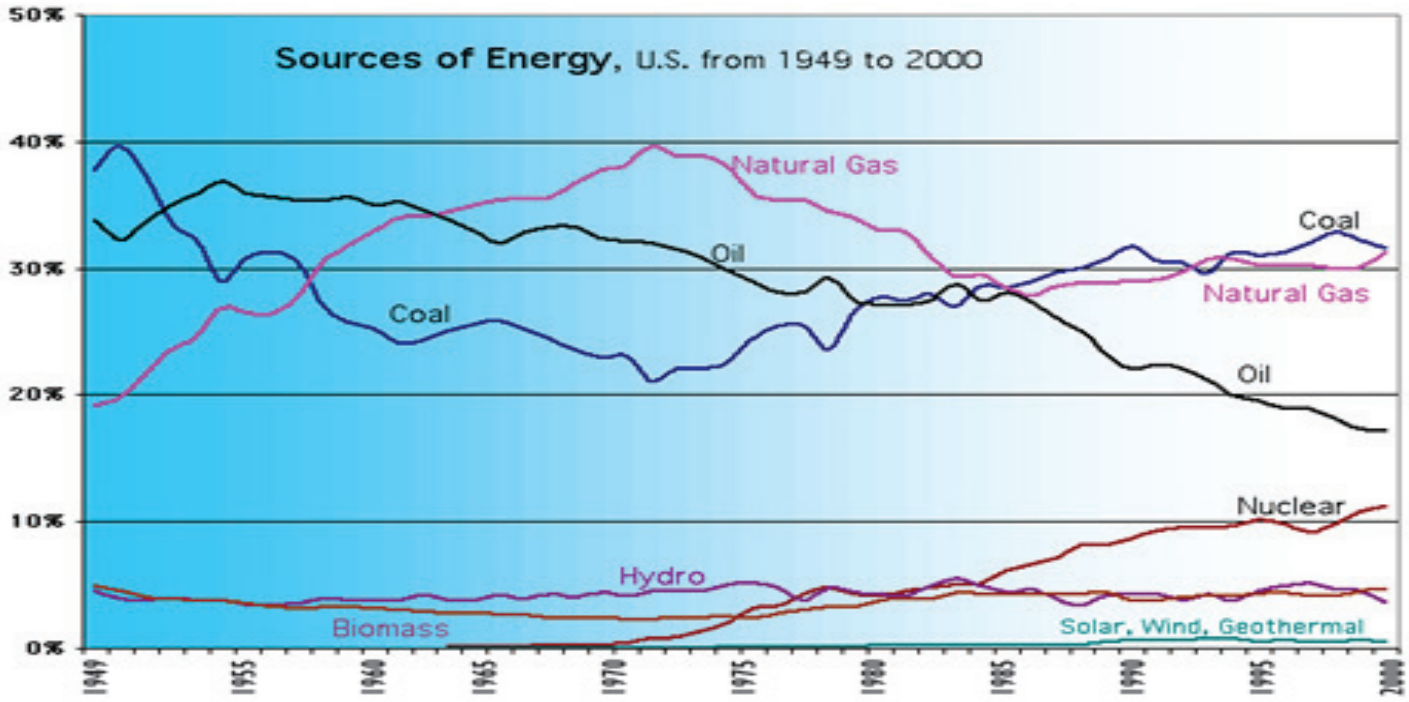
150 years ago, the average frontier home in the American West burned 17.5 cords of wood for heating and cooking. If you had lived back then, what tools would you have to help gather and cut that wood? _____

_____

_____

Answers: **1-** 1850; **2-** 80%; **3-** 90%; **4-** Hydro, Biofuels & other (solar, wind, geothermal); **5-** Oil & Gas; **6-** 1948.
Tools available: Only hand-powered tools, and maybe a pack animal and wagon, unless you were very, very rich.

Sources of Energy in the United States



Name _____

1. In what year did Nuclear energy first provide 10% of total energy _____

2. In that same year, what percentage of our total energy did Coal provide? _____

3. In 1999, what percentage of our total energy did each of the following provide?
   Coal _____ Nuclear _____ Oil _____ Natural Gas _____
   Hydro _____ Solar, Wind, Geothermal _____ Biomass _____

4. What were the three largest providers of energy in 2000?
   _____
   _____
   _____

5. In what year did Natural Gas provide the lowest percentage of total energy?_____
   The highest? _____

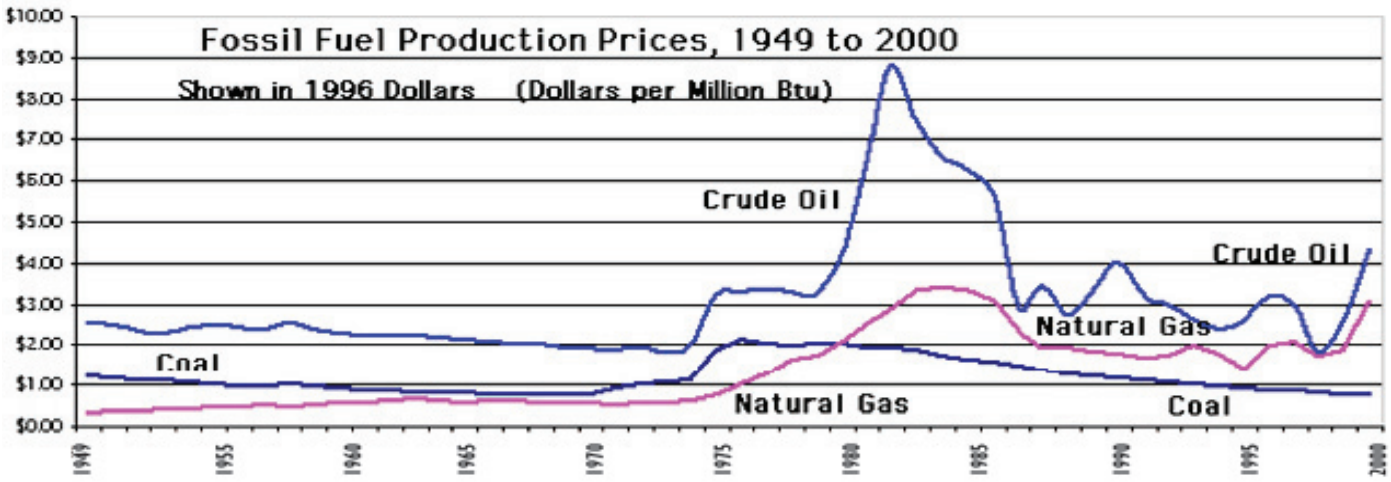
Average annual consumption by fuels used per household

Type of Fuel	Million Btu's in 2009
Electricity	154.0
Natural Gas	69.0
Fuel Oil	102.9
Kerosene	10.2
Liquified Petro Gas	41.7
Wood	29.7

Source: Statistics from Energy Information Administration

Answers: **1-** 1996; **2-** 33%; **3-** Coal- 32%, Nuclear- 11%; Oil- 17%; Natural Gas- 30%, Hydro- 5%, Solar, etc.- 1%, Biomass- 5%; **4-** Coal, Natural Gas, & Oil; **5-** 1949, 1971.
Biomass usually means wood, wood wastes, trash, alcohol— things that are burned other than the fossil fuels.

The Cost To Produce Energy



Name _____

1. In 1981, what was the difference in price between Crude Oil and Natural Gas? _____

2. What was the price of Natural Gas in 1991? _____

3. Which energy source has the lowest overall fluctuation in price?_____

4. Which form of energy had a price of $4.00 in 1979? _____

5. In 2000, which form of energy is showing a decrease in price? _____

6. In what year was the price of Natural Gas and Coal $2.00 each? _____

7. In what year did Crude Oil reach its highest price? _____
   What was that price? _____

8. In what year did Crude Oil reach its lowest price? _____
   What was that price? _____

The price information in this graph is expressed in "per million Btu's."
One Btu is roughly equal to the energy released from striking a match.
One million Btu equals: about 8 gallons of gasoline
about 100 pounds of coal
about 4 days of energy for the average single-family household

The Btu is a precise measure of energy-- the amount of energy required to raise the temperature of 1 pound of water 1 degree Fahrenheit

Source: Statistics from Energy Information Administration

Answers: **1-** about $5.50; **2-** about $1.65; **3-** Coal; **4-** Crude Oil; **5-** Coal; **6-** 1979; **7-** 1981, $8.78; **8-** 1972, $1.84.

Energy Produced in the United States

Top Coal Producing States

1 Wyoming
2-3 Kentucky - West Virginia
4 Pennsylvania
5 Texas
6 Montana
7 Illinois
8 Indiana
9 Virginia
10 North Dakota
11 Colorado
12 New Mexico
13 Ohio
14 Utah
15 Alabama
16 Arizona
17 Washington
18 Maryland
19 Tennessee
20 Louisiana
21 Oklahoma
22 Alaska
23 Missouri
24 Kansas

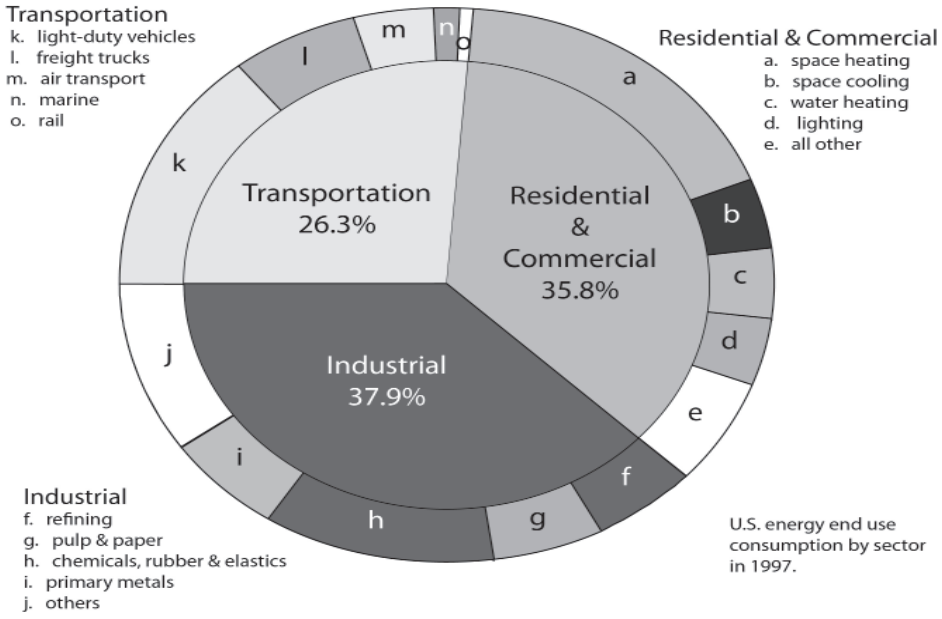
Top Crude Oil Producing States

1 Texas
2 Alaska
3 California
4 Louisiana
5 Oklahoma
6 New Mexico
7 Wyoming
8 North Dakota
9 Kansas
10 Colorado
11 Mississippi
12 Utah
13 Montana
14 Illinois
15 Alabama
16 Michigan
17 Ohio
18 Arkansas
18 Florida
20 Kentucky

Top Natural Gas Producing States

1 Texas
2 Louisiana
3 Oklahoma
4 New Mexico
5 Wyoming
6 Colorado
7 Kansas
8 Alaska
9 Alabama
10 California

How We Use That Energy



U.S. energy end use consumption by sector in 1997.

Electricity Generation in the U.S. is fueled by

Coal	Nuclear	Hydro	Natural Gas	Oil	Other *
47%	21%	7%	19%	1%	5%

* Includes Solar, Wind, Geothermal, etc.

Man's ingenuity has solved almost every problem (challenge)

These were all smart people, but their predictions weren't quite right.

Ask your students to defend these statements to help them gain a perspective of our habit to put limits on technology and on human ingenuity.

Ask, "What challenge do we face today that you think we cannot solve?" Then research what the experts are saying about those issues.

What use could this company make of an electrical toy?

Western Union President William Orton, rejecting Alexander Graham Bell's offer to sell his struggling telephone company to Western Union for $100,000

I confess that in 1901, I said to my brother Orville that man would not fly for fifty years. Ever since, I have distrusted myself and avoided all predictions. Wilbur Wright, U.S. aviation pioneer, 1908

I must confess that my imagination ... refuses to see any sort of submarine doing anything but suffocating its crew and floundering at sea. H. G. Wells, British novelist, 1901

Airplanes are interesting toys but of no military value.

Marshal Ferdinand Foch, French military strategist and future World War I commander, 1911

[Man will never reach the moon] regardless of all future scientific advances.

Dr. Lee de Forest, inventor of the Audion tube and a father of radio, Feb. 25, 1957

[Television] won't be able to hold on to any market it captures after the first six months. People will soon get tired of staring at a plywood box every night. Darryl F. Zanuck, head of 20th Century-Fox, 1946

There is no reason for any individual to have a computer in their home.

Kenneth Olsen, president and founder of Digital Equipment Corp., 1977

Computers in the future may ... perhaps only weigh 1.5 tons.

Popular Mechanics, forecasting the development of computer technology, 1949

Everything that can be invented has been invented.

Charles H. Duell, U.S. commissioner of patents, 1899

Who the (heck) wants to hear actors talk?

Harry M. Warner, Warner Brothers, 1927

We don't like their sound. Groups of guitars are on the way out.

Decca Records, rejecting the Beatles, 1962

***Every Year*— 38,052 pounds of new minerals must be provided for every person in the United States to make the things we use every day**


8,509 lbs. **Stone** used to make roads, buildings, bridges, landscaping, and for numerous chemical and construction uses


5,599 lbs. **Sand & Gravel** used to make concrete, asphalt, roads, blocks and bricks


496 lbs. **Cement** used to make roads, sidewalks, bridges, buildings, schools and houses


357 lbs. **Iron Ore** used to make steel— buildings; cars, trucks, planes, trains; other construction; containers


421 lbs. **Salt** used in various chemicals; highway deicing; food & agriculture


217 lbs. **Phosphate Rock** used to make fertilizers to grow food; and as animal feed supplements


164 lbs. **Clays** used to make floor & wall tile; dinnerware; kitty litter; bricks and cement; paper


65 lbs. **Aluminum (Bauxite)** used to make buildings, beverage containers, autos, and airplanes


12 lbs. **Copper** used in buildings; electrical and electronic parts; plumbing; transportation


11 lbs. **Lead** 87% used for batteries for transportation; also used in electrical, communications and TV screens


6 lbs. **Zinc** used to make metals rust resistant, various metals and alloys, paint, rubber, skin creams, health care and nutrition


36 lbs. **Soda Ash** used to make all kinds of glass; in powdered detergents; medicines; as a food additive; photography; water treatment


5 lbs. **Manganese** used to make almost all steels for construction, machinery and transportation


332 lbs. **Other Nonmetals** have numerous uses: glass, chemicals, soaps, paper, computers, cell phones


24 lbs. **Other Metals** have the same uses as nonmetals but also electronics, TV and video equipment, recreation equipment, and more

Including These Energy Fuels

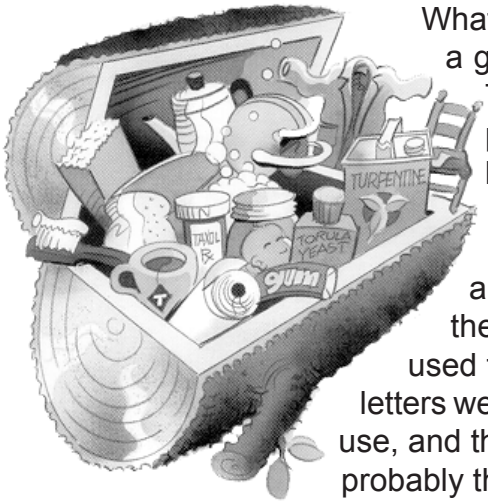
• 951 gallons of **Petroleum** • 6,792 lbs. of **Coal** • 80,905 cu. ft. of **Natural Gas** • 1/4 lb. of **Uranium**

To generate the energy each person uses in one year—

The average American uses 18 cubic feet of wood and 749 pounds of paper— equal to a 100-foot tree with an 18 inch trunk— each year.

From A to Z

Things that come from Trees



What do a dollar bill, the Declaration of Independence, the Mayflower, a guitar, chewing gum and a glass of orange juice have in common? They were all made possible by trees! Paper, wood and other forest products are a part of America's history and a part of our everyday lives.

Native Americans used wooden tools to hunt for food and provide shelter for their families. Settlers sailed to America in wooden ships, and our nation's most important religious and legal documents—from the Bible to the Bill of Rights—are preserved on paper. Today, paper is used for the books, magazines and newspapers we read, as well as the letters we write. Scientists use tree extracts in many of the health products we use, and the foods we eat. Wood provides us with housing and heating—and probably the desk and chair you use each day at school.

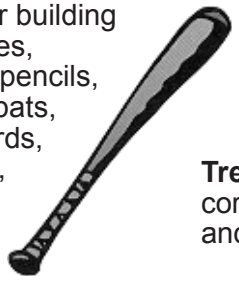
"Wood" you believe It? **More than 5,000 things are made from trees.**

Thanks to today's new technologies, close to 100 percent of a tree is used—with hardly any waste.

Which forest products does your family use?

Paper products — boxes, copier paper, library books, grocery bags, newspapers, napkins, envelopes, and movie tickets.

Hardwood products — lumber for building new homes, furniture, pencils, baseball bats, skateboards, hammers, crutches, and fences.



Tree extracts — cologne, baby food, clothing, carpeting, football helmets, milk shakes, hair spray, deodorant, and toothpaste.

Tree bark — cork boards, shoe polish, and garden mulch.

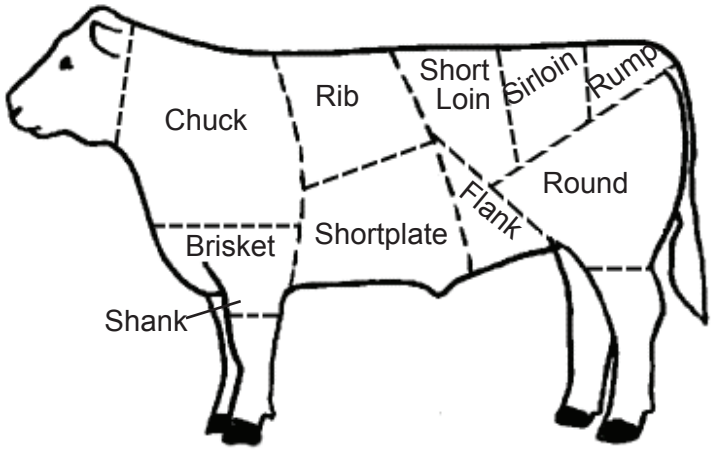
Lignin (lig' nan) is a sticky substance found in the fibers of trees. It is used in many food and health products.

- The rubber for bicycle tires comes from the Rubber tree.
- Cinnamon is actually the inner bark of the Cinnamon tree.
- Rayon, a fabric used in today's clothes, is made from wood.
- Ice cream, shampoo and toothpaste all contain a wood fiber called cellulose.
- Some chewing gums are made from the sap of the Sapodilla tree.
- Sawdust and wood shavings, saved from manufacturing wood products, are recycled to help make paper grocery bags, corrugated boxes, and many other products.
- About 1.5 million tons of cacao beans, from the tropical Cacao tree, are used each year to make chocolate and cocoa products. That's greater than the weight of 300,000 elephants.
- Forests are oxygen factories. To grow a pound of wood, a tree uses 1.47 pounds of carbon dioxide and gives off 1.07 pounds of oxygen.

For more information, visit
www.afandpa.org/

Agricultural Products mean more than just food

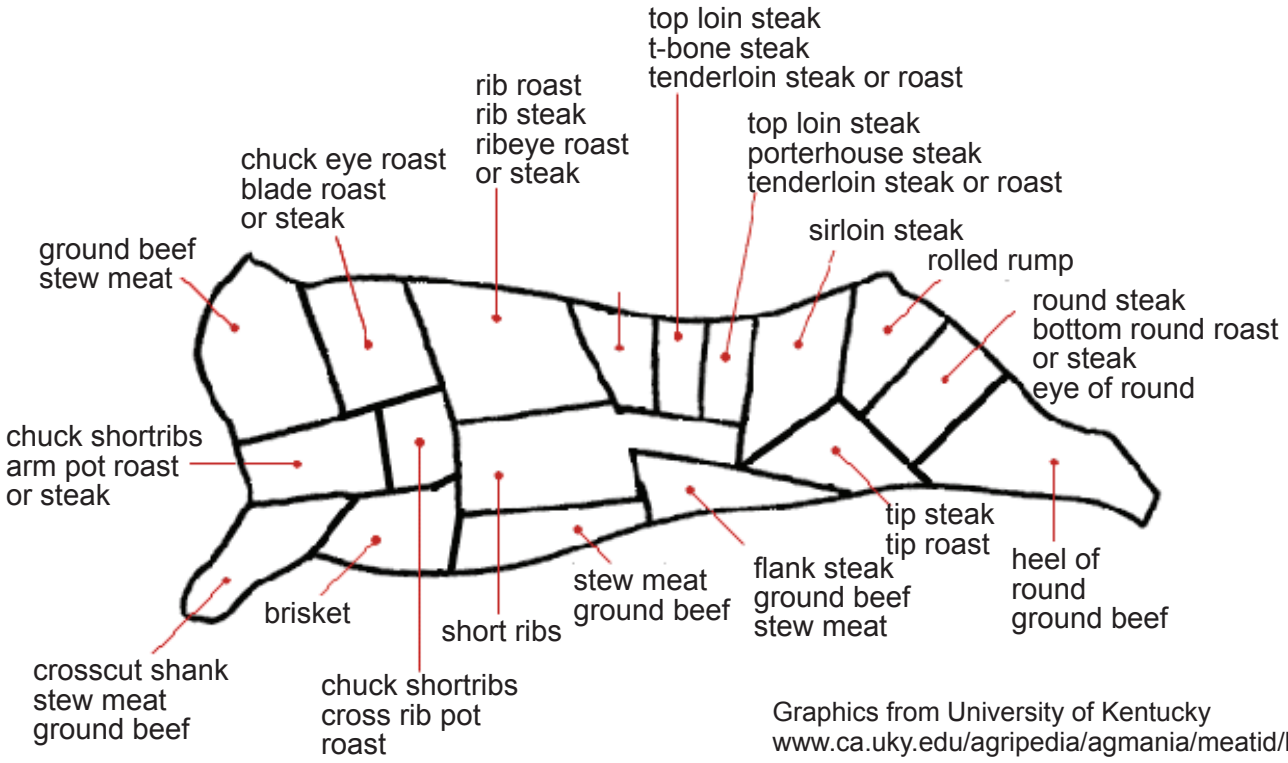
The most valuable agricultural product in the U.S. provides more than food



Other parts you may eat are the heart, liver, kidney and tongue. There are many other things you eat that contain various parts of a cow that you may not be aware of such as marshmallows, chewing gum, cookies, ice cream, yogurt, mayonnaise and different "light" products, gelatins, cheeses, candies and, of course, milk.

The leather from a cow is also used to make many different products, such as shoes and boots, luggage, leather sporting goods, upholstery and textiles.

Of course, we all know what we do with the manure provided by cows.



Graphics from University of Kentucky
www.ca.uky.edu/agripedia/agmania/meatid/beefcuts.htm

Now look at all the other things that are made from a cow.

- candles
- crayons
- deodorants
- soaps
- toothpaste
- insecticides
- pet foods
- photographic film
- shampoo
- shaving cream
- glue
- fabric softeners
- violin strings
- paints
- cosmetics
- plastics
- detergents
- floor wax
- bone china
- hydraulic brake fluid
- lubricants
- machine oils
- car polishes and waxes
- asphalt
- printing ink
- cement blocks
- explosives
- whitener for paper

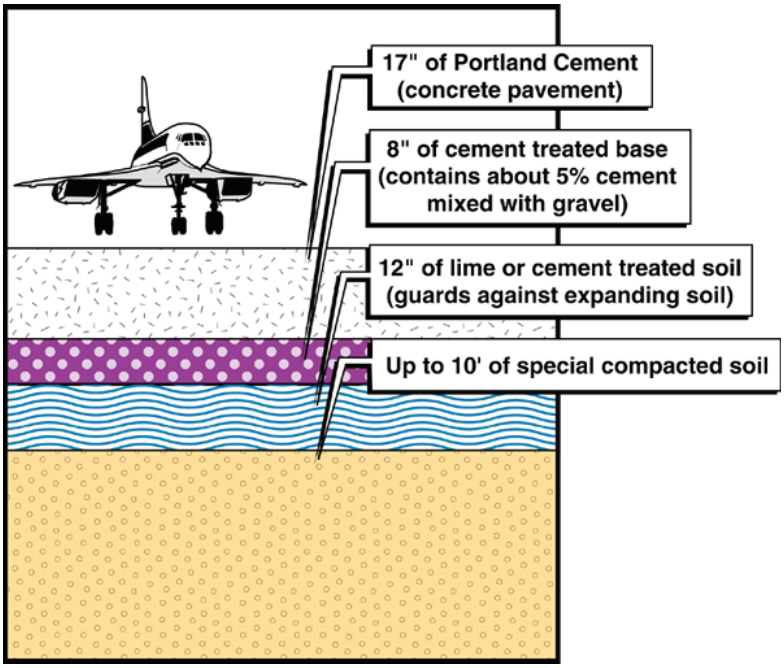
And there are medicines and medical uses in surgery, research, and routine health care.

From: www.beef.org/

How much concrete does it take to fly an airplane?

Airport Photo courtesy of www.fez.go.kr

Answer: *None*. But when it is time to land, there is good, high quality aggregate and cement in that runway.



According to the Department of Transportation, there are 19,854 airports in the USA.

www.mii.org

Updated October 2011